Casella Natural Gas Vehicle Initiative

Casella Waste Systems, Inc.

CNG makes economic sense for waste trucks

Equipment costs

- CNG trucks cost roughly $30k more than a diesel trucks, while a CNG fueling station costs 350k to $1 million.
- Federal and some state grant money available.

Operating costs

- Maintenance cost equal to or less than diesel and gas.
- No diesel particulate filter (DPF) or selective catalytic reduction (SCR) or associated maintenance. Installed 3 way catalyst, no maintenance.

Fuel Costs

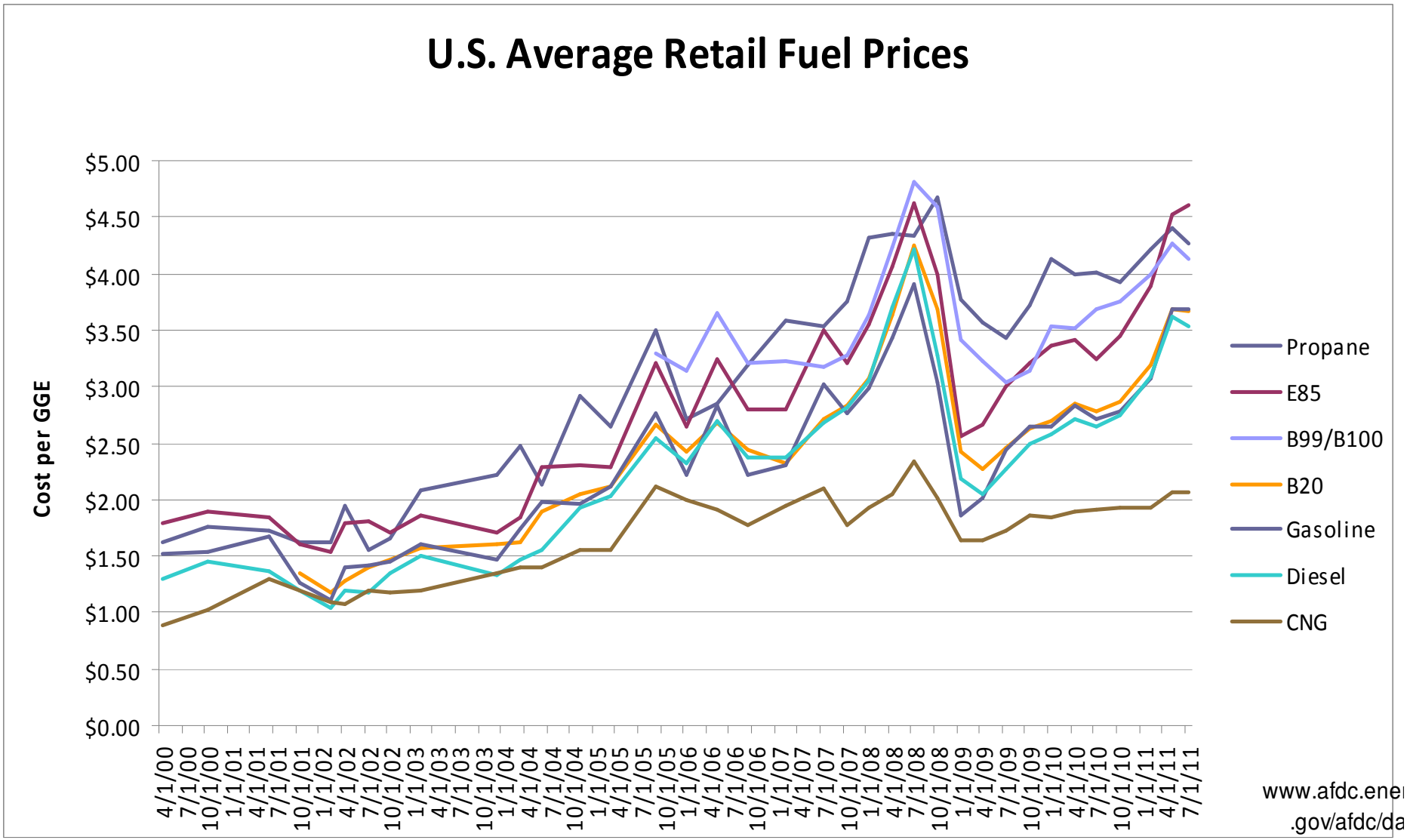
- CNG costs roughly $1.75 less per Diesel Gal Equivalent (DGE) in the current market.
- CNG pricing historically has been less volatile than other fuels.
- U.S. Natural gas reserves are estimated at least 120 years.

Why is Casella choosing CNG for our waste trucks?

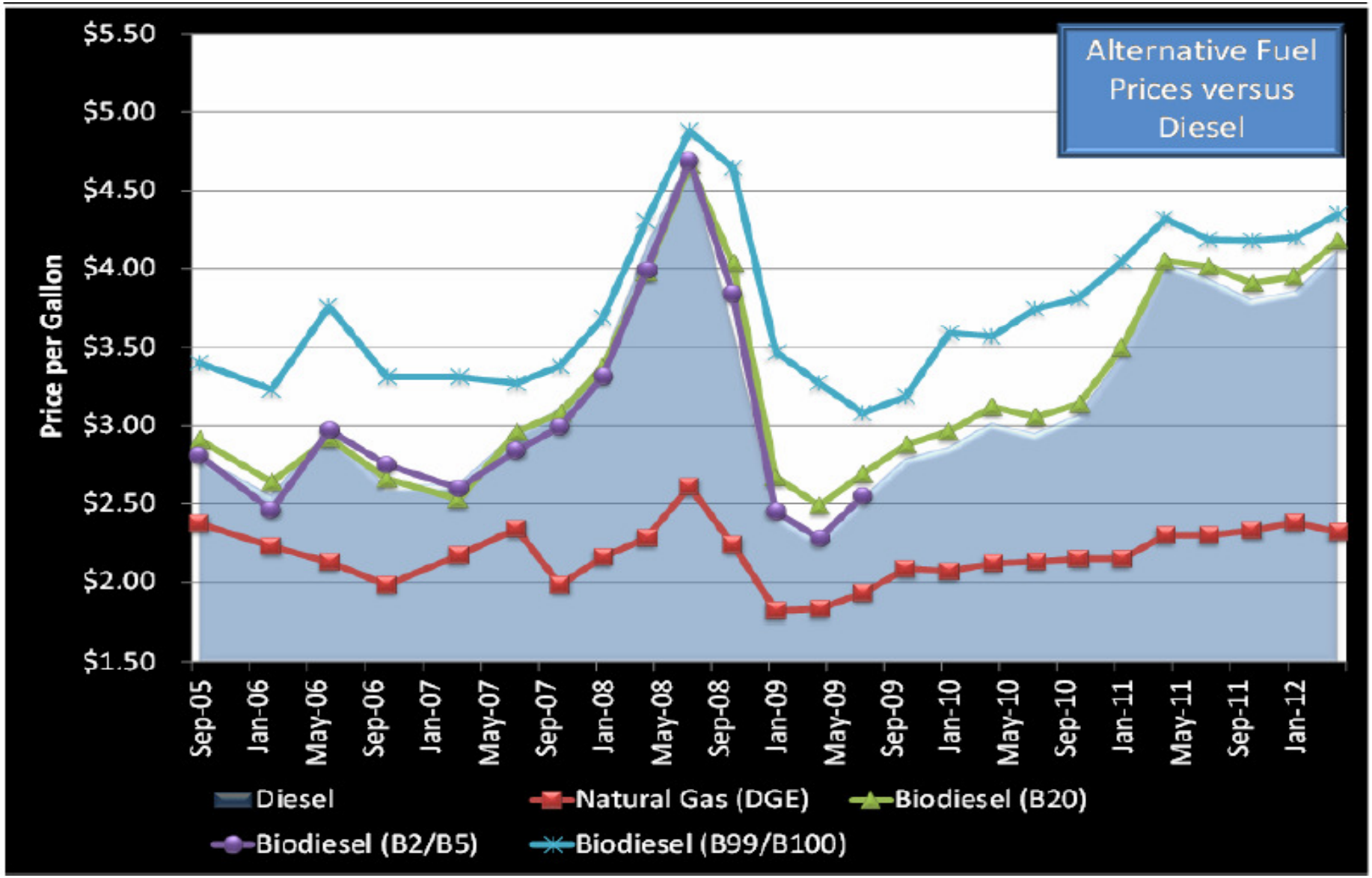
CNG meets our business, sustainability, operating, and safety goals:

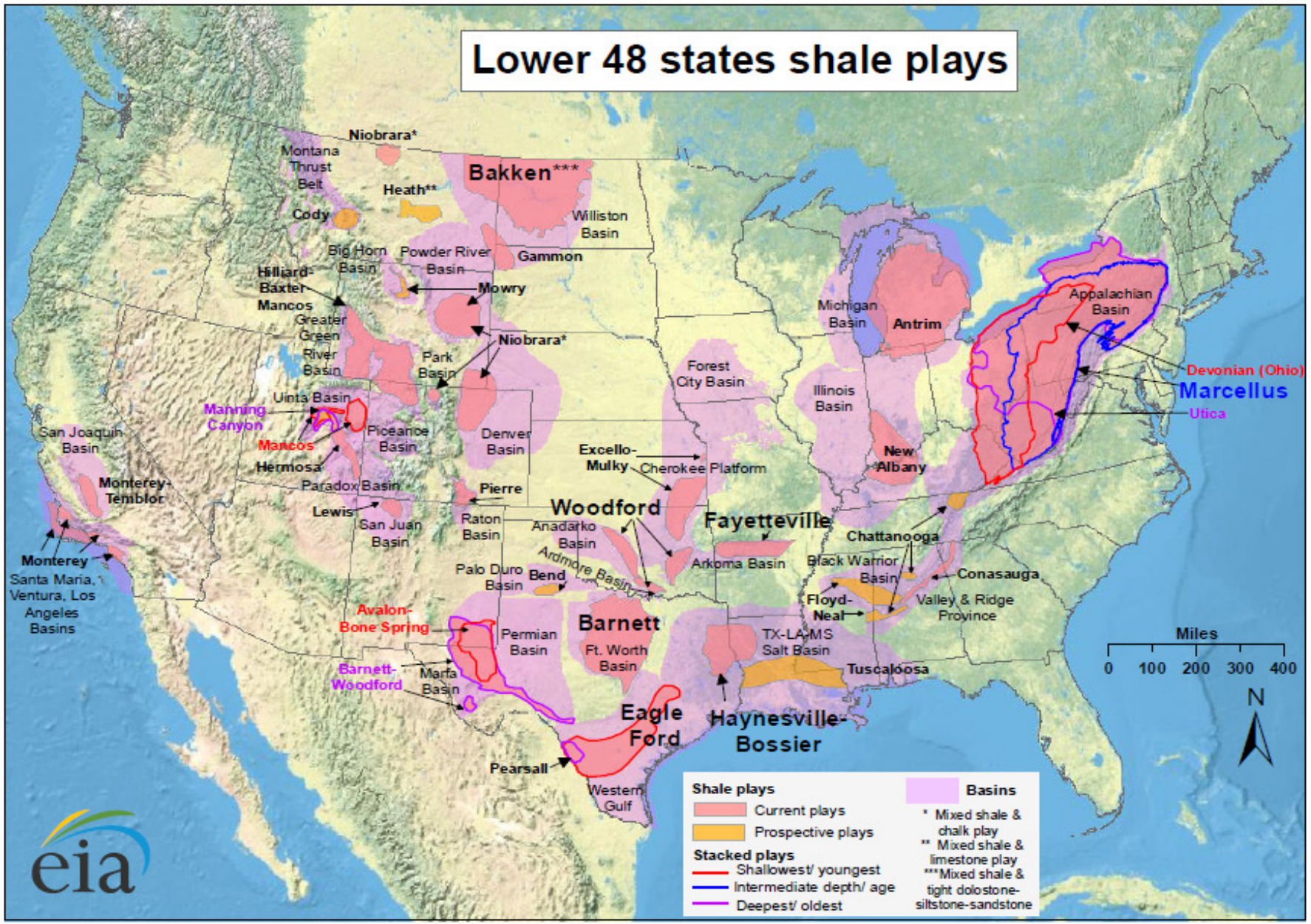
- Business – provides positive investment returns and reduced fuel cost volatility.
- Sustainability – much improved emissions profile over diesel.
- Operating – proven technology that meets our operating standards on the road, quieter than diesel, simplifies repairs & reduces oil change intervals.
- Safety – safer than diesel, disperses quickly, has higher ignition temperature.
- Foreign Oil Dependence and trade deficit – will help free us from reliance on OPEC, domestic!!!

CNG pricing has been stable and less volatile than other fuels

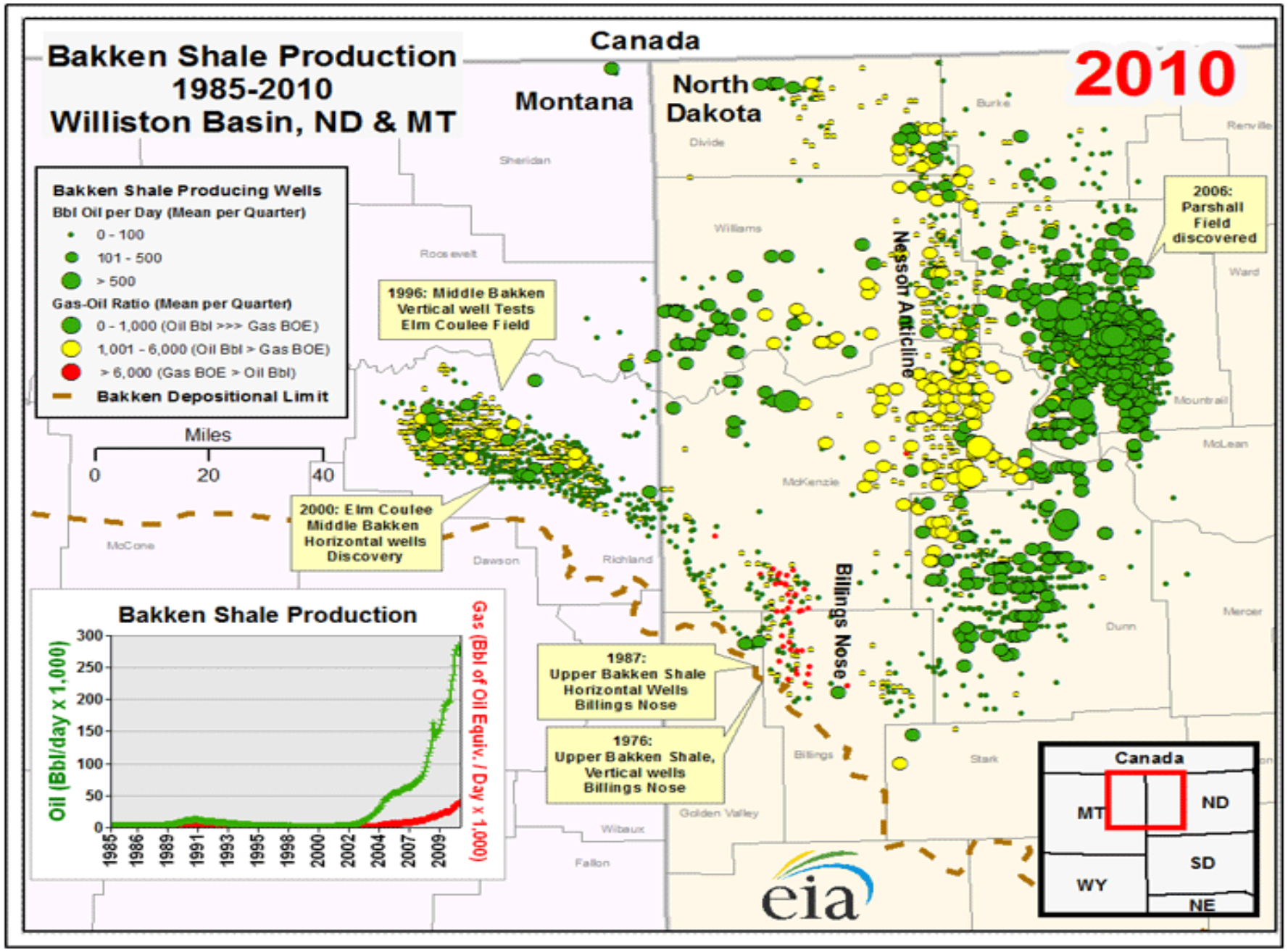


Clean Cities Alternative Fuel Price Report for April 2012





Source: Energy Information Administration based on data from various published studies.
Updated: May 9, 2011


Bakken Shale Production
1985-2010
Williston Basin, ND & MT
Canada
Montana
North Dakota
2010
Bakken Shale Producing Wells
Bbl Oil per Day (Mean per Quarter)
0 - 100
101 - 500
> 500
Gas-Oil Ratio (Mean per Quarter)
0 - 1,000 (Oil Bbl >>> Gas BOE)
1,001 - 6,000 (Oil Bbl > Gas BOE)
> 6,000 (Gas BOE > Oil Bbl)
Bakken Depositional Limit
Miles
0
20
40
1996: Middle Bakken Vertical well Tests Elm Coulee Field
2000: Elm Coulee Middle Bakken Horizontal wells Discovery
2006: Parshall Field discovered
Nesson Anticline
Billings Nose
1987: Upper Bakken Shale Horizontal Wells Billings Nose
1976: Upper Bakken Shale, Vertical wells Billings Nose
Bakken Shale Production
Oil (Bbl/day x 1,000)
Gas (Bbl of Oil Equiv. / Day x 1,000)
300
250
200
150
100
50
0
1985
1986
1989
1991
1993
1995
1998
2000
2002
2004
2007
2009
Canada
MT
ND
SD
WY
NE
eia

CNG Trucks meet operating and maintenance requirements

Proven operating track record.

- Cleaner fuel means less exhaust treatment is required to meet 2010 EPA rules.
- CNG trucks have excellent on-road performance, with great response and plenty of power.
- 15-20% quieter than a diesel truck (CNG engines idle at 71.5 DBA vs. Diesel at 82.9 DBA).

Simpler engines and less expensive maintenance.

- Less complicated engines with more room in the engine compartment.
- Less maintenance required:
  - No Diesel Particulate Filter (DPF), only a catalytic converter.
  - No dual turbos.
  - Cleaner fuel = cleaner engine.

CNG trucks meet the highest safety standards

Natural gas is lighter than air.

- This means that it will not puddle like diesel fuel or sink to the ground like propane.
- Natural Gas will rise and dissipate in the atmosphere.

Natural gas has a higher ignition temperature than diesel.

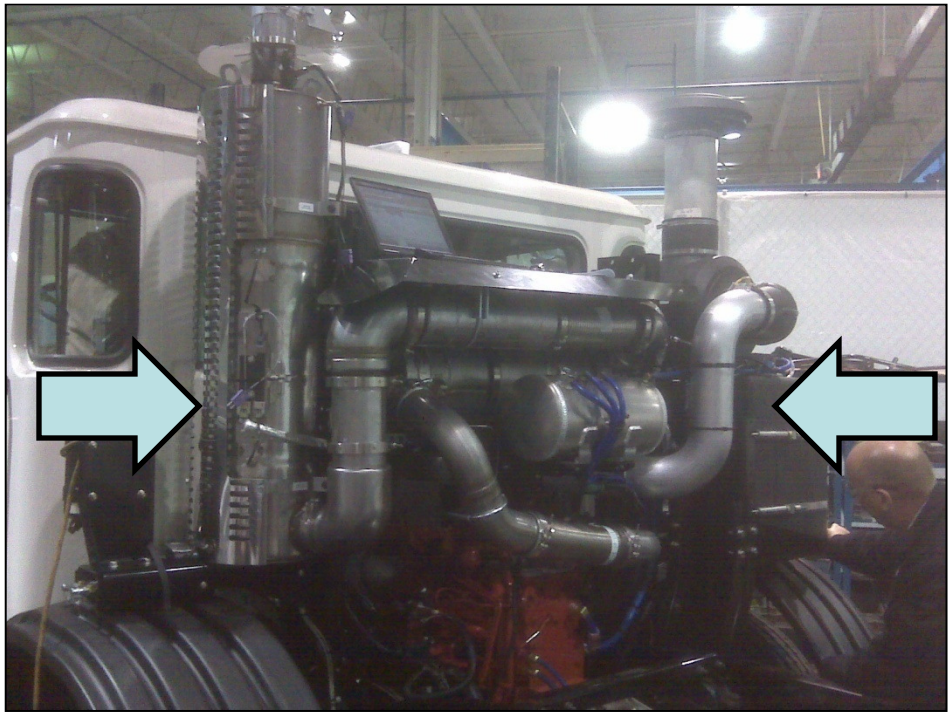
- Ignition temperature of 1100 to 1300°F vs. 400 to 500°F for diesel.

Maintenance facility requires several upgrades for safe operation.

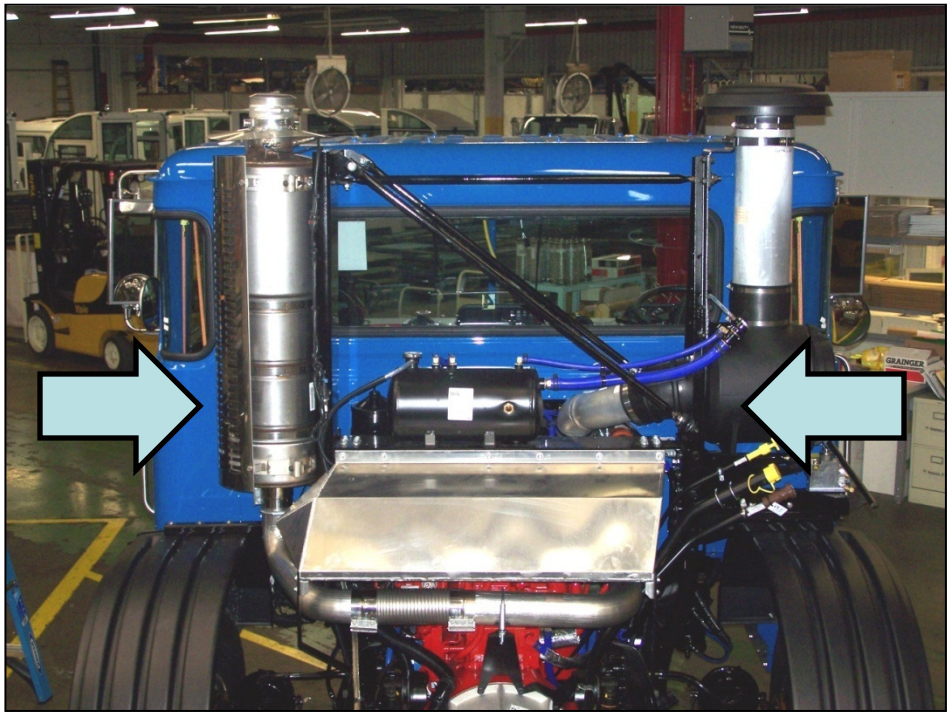
- Trucks can be serviced for up to 4 hours in normal maintenance facility.
- After 4 hours, truck needs to be serviced in a "CNG safebay," with proper methane detection and ventilation.

Truck Technology - Engines

2010 Diesel Exhaust Treatment



2010 Natural Gas Exhaust Treatment



Natural Gas Benefits

No Diesel particulate filter

Increased operator visibility

No Diesel emission fluid

Less complexity

The fleet so far

Williston, VT-	**7 dedicated CNG and 2 dual fuel vehicle**
	2 new for July delivery
	13 stanchion station, AVSG
Geneva, NY	**3 new dedicated CNG**
	4 converted through NYSERDA Grant
	16 stanchion station
Fort Edward, NY	**3 new dedicated CNG**
	3 converted through NYSERDA Grant
	6 new for July delivery
	16 stanchion station
Horseheads, NY	**Contract executed for 16 stanchion station**
	5 new for July delivery

Casella's first CNG front load truck

- Autocar with Cummins-Westport ISL G CNG engine with Agility 63 DGE CNG Tank
- Put in service in April 18, 2011.

Casella's first CNG automated side-load truck

- Autocar with Cummins-Westport ISL G CNG engine, right-hand drive.
- Put in service on 12-16-10.

2011 Autocar Bridgeport Split Body

Geneva, NY

Casella first “Time Fill” CNG station in Burlington, VT

Compressors and Controls

Time Fill Post Dispensers – Truck Hookup

Fast fill/Public Access CNG Station

Compressor and Storage tanks

Dispensers and fuel Island

Geneva, NY

Compressor Island

vehicles

Time Fill Post Dispensers – K rail